A Unique Potato Virus Collection

If a plant pathologist, breeder, geneticist, or grower discovered an unusual viral disease in a potato crop, where could that person go to identify the culprit?

One good place to check would be the Agricultural Research Service's Schultz Potato Virus Collection, named after ARS plant pathologist Erwin S. Schultz. He and plant pathologist Donald Folsom, with the Maine Agriculture Experiment Station, started this collection in 1916 at Aroostook State Farm at Presque Isle, Maine.

Researchers throughout the world have compared their infected potato plants with those maintained in the Schultz collection. Even now—after more than 80 years—the collection still contains progeny from the original infected plants.

Names given to the infectious diseases maintained in the collection were based on descriptive symptoms of so-called degeneration diseases of potato hosts. Scientists showed that diseases such as Aucuba mosaic, calico mosaic, latent virus, leaf rolling mosaic, mild mosaic, rugose mosaic, and severe mosaic are viral in nature.

In 1971, ARS researchers determined that a viroid was the cause of potato spindle tuber disease, which previously had been identified as a virus. Materials from the Schultz potato virus collection were used to identify these pathogens.

Plant pathologist Robert W. Goth, who has been curator since 1968, maintains the collection, now housed at Aroostook Farm and at ARS' Vegetable Laboratory in Beltsville, Maryland.

"Since 1930, viral reactions of many potato cultivars released jointly by USDA and cooperating agencies were evaluated using samples from this collection," says Goth.

Viruses are maintained in plants grown in insect-proof cages to avoid contamination and loss of original viruses. Each year, the virus-infected plants are grown out in these small, screened cages in the field to keep the collection going for future use. Goth saves four tubers from each cage for replanting at Presque Isle the next year and sends the remaining tubers to Beltsville for further use and study. All of the potato viruses in the collection are those most prevalent in the United States, Canada, and Europe.

"Interestingly," says Goth, "some pathogens in the collection affect not only potatoes, but other crops as well." Potato virus Y, for example, which can be spread by aphids, also affects tobacco, tomatoes, peppers, and many other plants.

"The collection continues to grow," Goth notes. A new Carla virus—isolated from the potato variety Red Lasoda in 1992 and named "potato latent virus" in 1998—was added to the collection this year. Researchers can request samples of any virus in the collection.—By **Tara Weaver-Missick,** ARS.

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Curbing Wind-Blown Dust

"We can watch the wind pick up soil, carry it in clouds miles above the ground, and then deposit dust over urban areas where it can cause respiratory problems," says ARS agricultural engineer Keith E. Saxton.

Saxton is speaking about a new computer prediction model for the Pacific Northwest's Columbia Plateau region. The model simulates dust storms from beginning to end by linking smaller models for wind erosion and dust emissions. Saxton and about 15 colleagues developed the model as part of the Northwest Columbia Plateau Wind Erosion/Air Quality Project.

The scientists are with ARS and Washington State University in Pullman and the University of Idaho at Moscow. They tested the model on a 50,000-square-mile section of the Columbia Plateau, using several previously recorded dust storms.

For those studies, "dust" was defined as particulate matter less than 10 micrometers in diameter—or PM-10. These particles are small enough to be drawn into the lungs. But more recent concerns about health problems have put the greatest focus on particles smaller than 2.5 micrometers—PM-2.5.

Often, about a third of the windblown soil particles caught in samplers are PM-2.5 in size. Other PM-2.5 sources include smoke from fireplaces, smokestacks, and fields that farmers burn to stop soilborne crop diseases.

"The Columbia Plateau is one of the world's largest areas of wind-blown volcanic soils," Saxton says. "These soils are extremely light and prone to forming dust clouds."

Farmers on the plateau typically grow winter wheat every other year. In the "off" year they leave the land bare to save soil moisture. But ARS agronomist Frank L. Young and several ARS and state scientists are developing crop rotations to keep land covered as much of the year as possible.

Saxton serves on the National Agricultural Air Quality Task Force charged with advising the Secretary of Agriculture on all aspects of air quality related to agriculture. This task force was formed in 1996 as ARS was beginning to expand its research on how agriculture affects air quality. Targets include not only dust but also odors, ozone, pesticides, and ammonia emissions from animal operations.

Following the task force's recommendations, the U.S. Environmental Protection Agency has formally agreed to work closely with USDA when air quality issues involve agriculture. This will help both agencies face the environmental challenges of the new century.—By **Don Comis,** ARS.

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